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Editorial.—J. B. ELLIS and Dr. G. B. Martin, in the December *Naturalist* describe 24 new species of North American Fungi.

THE GENUS PANICUM has had enumerated under it as many as 850 species, which have now been reduced to 250.

THE POPULAR SCIENCE MONTHLY for December contains a portrait and sketch of Matthias Jacob Schleiden, a name inseparably connected with plant histology.

THE GARDENER'S MONTHLY continues to hold its own and its indefatigable editor collects every month a great amount of material which must be of great interest to the class of persons addressed.

MR. HARRY N. PATTERSON, of Oquawka, Ill., is about to print some very neat genus labels, including all the North American genera down to *Azolla*, numbering about 1500. They can be obtained at the rate of 20 cents per hundred, no orders being taken for less than the whole number.

THE AMERICAN NATURALIST closes its sixteenth volume handsomely and is well entitled to the position of the most popular scientific periodical in the country. The department of botany, under the direction of Prof. Bessey, has been a great success during the past year and promises the same for the next.

MR. J. G. LEMMON continues to advertise his splendid collections at a very low price. Sets of Phænogams are offered at \$7.50 per 100, while over 70 species of ferns, containing several new to North America, and some new to science, can be obtained at 15 cents each. New species are offered at 25 cents each.

PROF. W. J. BEAL has long been experimenting in the cross-breeding of Indian corn. During the last season some "crossed seed" was planted, having been obtained from parents raised 100 miles apart, both of the same variety. The result was that "the crossed stock exceeded the pure stock of the best parent as 121 exceeds 100."

AMONG THE EDITORIALS of the last GAZETTE was one referring to the "nutlet" of *Hamamelis*, which should of course read "seeds." It might have been mentioned in the same connection that the

seeds are thrown just as in *Viola*, by the squeezing together of the valves, just as a moist apple seed is projected from between the fingers by simple pressure.

THE AM. MONTHLY MICR. JOUR. says that if the pollen grains of *Narcissus poeticus* be placed in the mucilage obtained from the stem of the plant and kept at a temperature of 55° to 60° Fahr. the pollen tubes will grow rapidly and currents of protoplasm will be seen within them. This is surely worth a trial by our teachers. Talking of pollen grains, the same Journal says that castor oil is one of the best mounting mediums for them, clearing them beautifully and showing their markings very distinctly.

THE AUSTRALIAN BIG TREES are coming to be better known as the trackless forests of that new world are yielding up their secrets to the explorer. Victoria now claims to possess the biggest living "big tree" in the world. It is a *Eucalyptus amygdalina* and measures 380 feet to the top, and has a circumference of 60 feet at some distance from the ground. An exchange suggests a good comparison by saying that the tree only lacks 10 feet of being twice as high as Bunker Hill Monument.

MR. R. DOUGLAS, of Waukegan, Ills., one of our most experienced foresters, writes for the last *Gardener's Monthly* upon the subject of the succession of forest growth. His extended observations go to show that forests destroyed by the axe, and the fire kept out, will reproduce the same species. In burned districts however such is not the case, the first tree making its appearance being generally the Aspen, sometimes the White Birch. The only coniferous trees that can ever survive such a catastrophe are a few pines with very hard cones.

IN THE TORREY Bulletin for November is given an account with figures, of a curious phenomenon described in *La Nature*. In South America north of the Amazons there was found a small reptile, the jaracaca, within the trunk of a tree of common occurrence, the "ipe-mirim," whose body, with the exception of the center, had become completely lignified, even some of the delicate anatomical details being faithfully retained, just as in petrification. Of course the reptile was imbedded in the cambium-layer. Other cases are given illustrating the same power of the cambium.

FLORA OF JACKSON COUNTY, by Frank Bush, has just been received. So far as title page or introduction tell we are left to guess at the state, which only appears in the imprint to be Missouri. In lists meant for foreign distribution the name of the state should be as prominent as that of the county. Mr. Bush has given us a very creditable catalogue, of 20 pages, and 600 species. The "Introduction" gives a good idea of the topography of the county and contains the following general statement with regard to the plant orders: "As will be seen, our Flora is devoid of Club-mosses, Pines, Spruces and Heaths, contains but few Lilies,

Orchids, Polemoniums and Ferns, while it is very rich in Composites, Labiates, Figworts and Solanums."

MR. MEEHAN in a recent communication to the Philad. Acad. Sci. brought up the question of the manner of entrance of the sporidia of parasitic fungi. The specimens suggesting the question were the common *Panicum sanguinale*, or "crab-grass," which were infested by *Ustilago Rabenhorstiana*. Dr. E. Queckett in the Trans. Linn. Soc. had detailed some experiments which seemed to show that the sporidia of the ergot might pass into the circulation of the plant in the water absorbed by the roots. Most unlikely as this seems Mr. Meehan thought his observations looked in the same direction. The *Panicum* observed was in a field full of individuals and while 50 culms of one plant were infested, the culms interlocking with them and the thousands of others were entirely free; and besides the spikelets were attacked while closely invested by the sheath. All this of course is of the nature of negative proof, but taken with Queckett's experiments may mean something.

FLORA OF NORTH AMERICA.—In the last GAZETTE there was published a part of Dr. Gray's address at Montreal upon the above subject. The part selected was that describing his own relation to North American Botany. We give this month that which gives an account of the work upon the Flora of North America before the publication of Torrey and Gray's Flora.

Only two Floras of North America have ever been published as completed works, that of Michaux and that of Pursh. A third was begun (by Dr. Torrey, assisted by a young man who is no longer young) by the publication in the summer of 1838 of a first fasciculus; the first volume of 700 pages was issued two years afterward; and 500 pages of the second volume appeared in 1841 and in the early part of 1843. The time for continuing it in the original form has long ago passed by. Its completion in the form in which I have undertaken it anew, is precarious. *Precarious* in the original sense of the word, for it is certainly to be prayed for: precarious, too, in the current sense of the word as being uncertain; yet not so, according to an accepted definition, viz: "uncertain, because depending upon the will of another;" for it is not our will but our power that is in question; and it is only by the combined powers and efforts of all of us interested in Botany that the desired end can possibly be attained.

It were well to consider for a moment how and why it is that a task which has twice been—it would seem—easily accomplished has now become so difficult.

The earliest North American Flora, that of the elder Michaux, appeared in the year 1803. It was based entirely upon Michaux's own collections and observations, does not contain any plants which he had not himself gathered or seen, is not, therefore,

an exhaustive summary of the botany of the country as then known, and so was the more readily prepared. Michaux came to this country in 1785, returned to France in 1796, left again in Baudin's expedition to Australia in 1800, and died of fever in Madagascar in 1802. The Flora purports to be edited by his son, F. A. Michaux, who signed the classical Latin preface. The finish of the specific characters, and especially the capital detailed characters of the new genera, reveal the hand of a master; and tradition has it that these were drawn up by Louis Claude Richard, who was probably the ablest botanist of his time. This tradition is confirmed by the fact that Richard's herbarium (bequeathed to his son, and now belonging to Count Franqueville) contains an almost complete set of the plants described, and I found that the specimens of Michaux supplied to Willdenow's herbarium at Berlin were ticketed and sent by Richard. Not only the younger Richard but Kunth also habitually cited the new genera of the work as of Richard, and some others have followed this example. Singularly enough, however, there is no reference whatever to Richard in any part of the Flora, nor in the elaborate preface. The most venerable botanist now living told me that there was a tradition at Paris that Richard performed a similar work for Person's *Synopsis Plantarum*, and that he declined all mention of his name in the Synopsis and in the Flora, because the two works—contrary to the French school—were arranged upon the Linnæan Artificial System. He had his way, and the tradition may be preserved in history; but his name cannot be cited for the genera *Elytraria*, *Micranthemum*, *Elodea*, *Stipulicida*, *Dichromena*, *Oryzopsis*, *Erianthus*, and the like. For, by the record these are of Michaux, *Flora Boreali-Americana*, and not of Richard.

Michaux's explorations extended from Hudson's Bay, which he reached by way of the Saguenay, to Florida, as far, at least, as St. Augustine and Pensacola; he was the first botanical explorer of the higher Alleghany Mountains, and, crossing these mountains in Tennessee, he reached the Mississippi in Illinois, and was as far south as Natchez. His original itinerary, which I once consulted, is preserved by the American Philosophical Society, at Philadelphia, to which it was presented by his son. It ought to be printed. That little journal shows that it was not Michaux's fault that the first Flora of North America was restricted to the district east of the Mississippi River. He had a scheme for crossing the continent to the Pacific. He warmly solicited the government at Washington to undertake such an exploration, and offered to accompany it as naturalist. This may have been the germ or the fertilizing idea of the expedition of Lewis and Clark, which was sent out a few years afterward by Jefferson, to whom, if I rightly remember, Michaux addressed his enterprising proposal.

Leaving out the Cryptogams of lower rank than the Ferns, we find that the Flora of Michaux, published at the beginning of

this century, say eighty years ago, contains 1530 species, in 528 genera. No very formidable number; as to species (speaking without a count) little over half as many as are described in my Manual of the Botany of the Northern States, which covers less than half of Michaux's area.

Eleven years afterward, namely, in the year 1814 (the preface is dated December, 1813), appeared the second Flora of North America, namely the *Flora Americae Septentrionalis*, by Frederick Pursh. This was not confined to the author's own collections, but aimed at completeness, or to give "a systematic arrangement and description of the plants of North America, containing, besides what have been described by preceding authors, many new and rare species, collected during twelve years' travels and residence in that country."

It appears that Pursh was born at Tobolsk, in Siberia, of what parentage we do not know. He himself tells us, in his preface, that he was educated in Dresden, and that he came to this country—to Baltimore and Philadelphia,—at the close of the last century, when he must have been only twenty-five years old. He was able to make the acquaintance not only of Mublenberg, who survived until 1815, and of Wm. Bartram, who died in 1823, but also of the veteran Humphrey Marshall, who died in 1805. His early and principal patron was Dr. Benjamin Smith Barton, who supplied the means for most of the travels which he was able to undertake, and who, as Pursh states, "for some time previous had been collecting materials for an American Flora." Pursh's personal explorations were not extensive. From 1802 till 1805 he was in charge of the gardens of Wm. Hamilton, near Philadelphia. In the spring of the latter year, as he says, he "set out for the mountains and western territories of the Southern States, beginning at Maryland and extending to the Carolinas (in which tract the interesting high mountains of Virginia and Carolina took my particular attention), returning late in the autumn through the lower countries along the sea-coast to Philadelphia." But, in tracing his steps by his collections and by other indications, it appears that he did not reach the western borders of Virginia nor cross its southern boundary into the mountains of North Carolina. The Peaks of Otter and Salt-pond Mountain (now Mountain Lake,) were the highest elevations which he attained. Pursh's preface continues: "The following season, 1806, I went in like manner over the Northern States, beginning with the mountains of Pennsylvania and extending to those of New Hampshire (in which tract I traversed the extensive and highly interesting country of the Lesser and Great Lakes), and returning as before by the sea-coast." The diary of this expedition, found among Dr. Barton's papers and collections in possession of the American Philosophical Society, has recently been printed by the late Mr. Thomas Potts James. It shows that the

journey was not as extended or as thorough as would be supposed; that it was from Philadelphia directly north to the Pokono Mountains, thence to Onandaga, and to Oswego,—the only point on the Great Lakes reached,—thence back to Utica, down the Mohawk Valley to Saratoga, and north to the upper part of Lake Champlain and to the lesser Green Mountains in the vicinity of Rutland, but not beyond. Discouraged by the lateness of the season, and disheartened—as he had all along been—by the failure and insufficiency of remittances from his patron, Pursh turned back from Rutland on the 22d of September, reached New York on the 1st of October, and Philadelphia on the 5th. The next year (1807) Pursh took charge of the Botanic Garden which Dr. Hosack had formed at New York and afterward sold to the State, which soon made it over to Columbia College. In 1810, he made a voyage to the West Indies for the recovery of his health. Returning in the autumn of 1811, he landed at Wiscasset, in Maine, “had an opportunity of visiting Professor Peck of Cambridge College, near Boston,” and of seeing the alpine plants which Peck had collected on the White Mountains. At the end of the latter year or in 1812 he went to England with his collections and notes; and at the close of 1813, under the auspices of Lambert, he produced his *Flora*, consulting, the while, the herbaria of Clayton, Pallas, Plukenet; Catesby, Morrison, Sherard, Walter, and that of Banks. Evidently such consultations and the whole study must have been rapid. The despatch is wonderful. One can hardly understand the ground of the statement made by Lambert to my former colleague, Dr. Torrey, that he was obliged to shut Pursh up in his house in order to keep him at his work.

I do not know how Pursh was occupied for the next four years, nor when he came to Canada. But he died here at Montreal, in 1820, at the early age of forty-six. More is probably known of him here. If I rightly remember, his grave has been identified, and a stone placed upon it inscribed to his memory. A tradition has come down to us—and it is partly confirmed by a statement which Lambert use to make, in reference to the vast quantity of beer he had to furnish during the preparation of the *Flora*—that, in his latter days, our predecessor was given to drink, and that his days were thereby shortened.

In Pursh's *Flora* we begin to have plants from the Great Plains, the Rocky Mountains, and the Pacific Coast, although the collections were very scanty. The most important one which fell into Pursh's hands was that of about 150 specimens, gathered by Lewis and Clark on their homeward journey from the mouth of Columbia River. A larger collection, more leisurely made on the outward journey, was lost. Menzies in Vancouver's voyage had botanized on the Pacific coast, both in California and much farther north. Some of his plants were seen by Pursh in the

Banksian Herbarium, and taken up. I may here say that in the winter of 1838—39 I had the pleasure of making the acquaintance of the venerable Menzies, then about ninety-five years old.

In the Supplement, Pursh was able to include a considerable number of species, collected by Bradbury on the Upper Missouri, in what was then called Upper Louisiana,—much to the discontent of Nuttall, who was in that region at the same time, and who, indeed, partly and imperfectly anticipated Pursh in certain cases, through the publication by the Frasers of a catalogue of some of the plants collected by Nuttall.

To come now to the extent of Pursh's Flora, published nearly sixty-nine years ago. It contains 740 genera of Phænogamous and Filicoid plants, and 3076 species. Just about double the number of species contained in Michaux's Flora of eleven years before.

The Cell-State.—One of the most interesting articles recently published in the *Popular Science Monthly* is that of Prof. Ferdinand Cohn, of Breslau, bearing the above title. It is especially interesting to a lecturer and teacher who is always casting about for apt illustrations which will make plain and fix in the memory truths which stated in a technical way would make no impression. Prof. Cohn considers cells as individual citizens, leaves as villages, and the whole plant as a state, and very aptly carries out these figures in explaining the relation of different parts in the life work of the plant. How extensively he has done this may be inferred from his conclusion:

“Gifted writers on social politics have recently endeavored to illustrate the development and interrelations of human society by analogy with a living being and its cells. We have taken the converse course, and have endeavored to make the life of the plant and its cells comprehensible by a similitude with a state organization and its citizens. We have endeavored to show that what man has regarded as the highest ideal of his conscious effort in the struggles of the world's history has been prefigured in quiet accomplishment in the world of plants. It is the representative of the idea of the state which leaves its individual citizens to develop themselves freely according to their inborn natures, and to work together on an equal footing for the good of the whole; which preserves to the villages and the provinces their self-administration, and yet subjects them in every instant to the higher interests and laws of the whole; which appears ready armed against the external enemy, preserves peace and unity within; which applies the capital accumulated by the common labor of all the citizens to the advantage and advancement of the whole, without letting it be preyed upon by any; which in untiring activity never suffers a pause, and by continuous renovation endures for centuries, always increasing, always blossoming, and always bearing fruit.”

By way of illustration we extract the following sentence, descriptive of the work of the roots and leaves:

"The cells of the roots, like hewers and miners, sink numerous shafts in the spaces assigned to them, drive their galleries toward all points of the compass, in order to break up the mineral treasures, separate them from the incasing stone, and set the machinery of service into motion; day and night with inexhaustible diligence, they extract atom by atom of potash and ammonia, phosphoric and nitric acid, and, without working up their ore, deliver it over to the conducting vessels which transmit it by their powerful system of sucking and forcing pumps to the stem and the leaves. The leaves are cell-villages which perform their daily tasks in the air and the light. Their principle business is to obtain coal, which is the chief constituent of the vegetable body. Our atmosphere is an enormous coal-mine, many miles in thickness, that can not be exhausted in thousands of thousands of years. The coal, indeed, is not found pure in the air, any more than the metal in the ore, but is in combination with oxygen as a transparent gas, carbonic acid, and a peculiar art is required to separate it.

In the mining districts, smelting-houses are erected beside the pits, where the noble metal is extracted from the impure ores. The green cells of the leaves combine the art of the miner with that of the smelter, and have the power of extracting the pure carbon from the atmosphere. In order to perform this work, they must be shone upon by the sun, for the sunlight alone can excite in them the marvelous faculty. Having extracted the carbon, they combine it with water and with the mineral substances that have been drawn from the soil, and prepare from them the living matters out of which the plant itself builds up its cells, and which, taken up into the body of an animal, is transformed by it into flesh and blood."

Such illustrations lighten up the dry technicalities so often used in teaching and lie at the very basis of the great power possessed by some of our lecturers on botany.

Epidendrum cochleatum, L.—Some two years ago I mentioned having discovered in Southern Florida a curious and, to me, new *Orchid*. The plant came into flower during the summer following my discovery. I at once sent it to Prof. Watson for determination. I thought it might be new to science. In due time Prof. Watson reported it to be as above and sent me a full description. He remarked, however, that I was the first one to notice its occurrence in the United States, though the species is common in Central America and the West Indies. Mr. Curtiss also had never seen the species during his very extensive explorations in Florida. The plant in question I found at Jupiter Inlet on the Atlantic coast. It was clinging to the upper limbs of a large live oak and was the only specimen I have seen. Further investigation will undoubtedly reveal more.—W. W. CALKINS, *Chicago, Ill.*